

XX.—Remarks on the Natural Order Bignoniaceæ.

By BERTHOLD SEEMANN, Ph.D., F.L.S.

MR. MIERS, in concluding his "Observations on the Bignoniaceæ" in this Journal (ser. 3. vol. viii. p. 120), stated that having learnt my intention of continuing inquiries in that family, and wishing to avoid contravention, he had been induced to cede to me the priority, reserving, however, to himself the right of resuming the subject at a future time. I am fully sensible of the courtesy shown, but feel rather sorry, and I am sure the public will share my feeling, that Mr. Miers should, even for a time, have suspended his investigations of a natural order so much in need of a thorough revision, after having already thrown so much light upon it by a series of valuable observations and descriptions. The Bignoniaceæ have hitherto been handled so superficially by many authors, that even the labours of Don, Martius, DeCandolle, and Fenzl, important as they are, can scarcely be regarded as more than landmarks to guide us through a region of bewilderment and chaos, where there is room for more than one pair of eyes to observe, and more than one mind to draw conclusions.

It is not my intention to open my series of papers on the Bignoniaceæ by an elaborate criticism of Mr. Miers's "Observations on the Bignoniaceæ;" but as the result of his inquiries would seem to invalidate the characters upon which I and others maintained Crescentiaceæ and Bignoniaceæ as distinct orders, or, at all events, tribes, I am compelled to say a few words respecting them. The principal character dividing Crescentiaceæ from Bignoniaceæ proper is that the former have an indehiscent, the latter a dehiscent fruit. The genus *Tanaecium* I placed amongst Crescentiaceæ, because it is everywhere described as having an indehiscent fruit; and I had seen only flowering specimens of *T. albiflorum* and *T. crucigerum*, which form my first section; whilst of *T. lilacinum* and *T. parasiticum*, belonging to my second section (*Schlegelia*), I had seen, and in one instance eaten, the ripe fruit. Now, there are at the British Museum some loose fruit without any other remark save that they had come from Jamaica; and, though "these fruits are not accompanied by any dried specimen of the plant from which they were gathered," Mr. Miers referred them to *Tanaecium albiflorum*. I cannot admit the justice of this proceeding, and beg to recall to mind that by far the greater part of the confusion now existing in Bignoniaceæ has been caused by loose fruits and seeds being referred to plants with which they had nothing whatever to do. Mr. Miers has been led to form several erroneous conclusions by not being aware to what extent this has been done. For instance, when

he says that "in *Fridericia* the structure of the capsule and seeds completely agrees with that of *Jacaranda*," he was unaware that simply a genuine *Jacaranda* fruit had been figured with *Fridericia*,—a blunder made by Martius, but long ago rectified by Fenzl and DeCandolle. Again, when speaking of the fruit of *Spathodea campanulata*, he calls it, on the authority of a plate (t. 28) in Palisot de Beauvois, 'Fl. Owar.,' 4-celled, and "having numerous orbicular lentiform seeds with a narrow wing." The plate referred to represents a wretchedly drawn fruit, which we are told must either belong to *Spathodea campanulata* or *S. laevis*; and, on the strength of this, Fenzl was tempted to remove *Spathodea* to Crescentiaceæ. But, as we now know the fruits of both those species, neither of which bear the slightest resemblance to that represented in the plate, we must look elsewhere, and have no difficulty in referring it to *Kigelia pinnata*—a plant very common in the whole region inhabited by the two *Spathodeas* named. Indeed, Mr. Miers was very nearly drifting towards the same conclusion, when his ready eye detected certain details agreeing with the figure of the fruit of *Kigelia* given in Delessert's 'Leones.'

Caution, and an ardent wish not to increase the existing confusion, compel me therefore to reject the assumption that the loose fruits preserved at the British Museum belong to *Tanaecium albiflorum*. They may belong to *Adenocalymna*, a genus of which nobody but Mr. Miers has seen the fruit. Should, however, at a future period, evidence be adduced that the fruits in question really belong to *Tanaecium albiflorum* and its nearest ally, I am quite prepared to admit the justice of separating generically my two sections of *Tanaecium*; but the materials at my disposal left no choice save that of combining them under one genus.

The belief that the fruit figured by Palisot de Beauvois belonged to *Spathodea*, instead of *Kigelia*, has led Mr. Miers into the further error of conjecturing the relationship of *Parmentiera* and *Spathodea*—two genera which agree in nothing save their spathaceous calyx. It is also a matter of regret that Mr. Miers assumed that I had copied my character of the genus *Parmentiera* from DeCandolle's account of the fruit of *P. edulis*, a description framed entirely upon the drawing and descriptions of Moeno and Hernandez. Mr. Miers forgets that I was the discoverer of the famous Candle-tree (*Parmentiera cerifera*, Seem.), and does not seem to know that I lived for some weeks in forests composed of it. The singularities of this strange production early attracted my notice, and I made numerous notes on the spot, which, with the specimens brought home, served as the basis of what I have written upon the subject. There is not the slightest tendency in the fruit towards becoming dehiscent and "evidently

2-valvular." The fruit, when fully ripe, simply enters upon a state of putrefaction. I must therefore object to the opinion that "the genus ought at once to be consigned to Bignoniaceæ." Mr. Miers is doubtful what part of the fruit is eaten by cattle. I stated that cattle, if fed with the fruit, soon get fat, and of course meant not a certain part, but the entire fruit.

If, then, all Crescentiaceæ have an indehiscent fruit, they must also have apterous seeds; for, as Lindley has justly remarked, no instance is known of the existence of winged seeds in indehiscent pericarps, as that would neutralize the object for which winged seeds seem to have been created. Yet Mr. Miers, again relying upon the correctness of figures when they are partly erroneous, assigns winged seeds to the Crescentiaceous genus *Colea*. "The several details," he says, "of *C. Mauritiana* (Bot. Mag. t. 2817), of *C. Telfairiæ* (ib. tab. 2976, and of *C. floribunda* (Bot. Reg. vol. xxvii. t. 19) all prove most distinctly the presence of a broad membranaceous wing around the seeds, as in *Bignonia*;" and "if," he continues in a foot-note, "the presence of a wing on the seed of *C. Telfairiæ* be questioned, there can no be doubt of its existence in *C. floribunda*." Neither the figure nor the description of *C. floribunda* in 'Bot. Reg.' vol. xxvii. t. 19 indicate the presence of a membranaceous wing; on the contrary, in that place, Lindley endorses the opinion that the division of Bignoniaceæ and Crescentiaceæ is founded upon important physiological and anatomical characters. With regard to the figure of *C. Mauritiana* in the 'Bot. Mag.,' it was taken from a drawing made abroad, by hands evidently not excelling in analyses; and in copying it again on stone, the lithographer, perhaps wishing to give greater distinctness to an obscurely drawn figure, may have made the seed appear almost winged. Bojer, who quotes this plate, and who had the plant growing in the Mauritius Garden, says most distinctly that, in common with *C. floribunda* and *Telfairiæ*, it has apterous seeds. It was also a positive mistake when, in a drawing of *Colea Telfairiæ*, transmitted to Sir W. J. Hooker and published in the 'Bot. Mag.,' a winged seed was introduced. This has been subsequently corrected; and in quoting t. 2976 of the 'Bot. Mag.' in my 'Synopsis Crescentiacearum,' I excluded fig. 2, as DeCandolle had done before me. *Colea Telfairiæ* has a fleshy indehiscent edible fruit, and is extensively cultivated in Madagascar, on account of its nutritious qualities and agreeable flavour. If it had a dry woody fruit like the Bignoniaceæ, how could it possibly be eaten? I therefore claim the genus *Colea*, on account of its indehiscent fruit and wingless seeds, as a genuine member of Crescentiaceæ. Besides, in most *Coleas* the flowers grow out of the trunk and old wood, which to my mind is perfectly convincing that the fruit is of more considerable

weight than the dry woody capsule of a Bignoniacea. The heaviest fruit borne by trees are always developed from flowers springing from the trunk and old wood. I instance *Crescentia*, *Theobroma*, the large-fruited *Myrtacea*. Mr. Miers occasionally witnessed the same mode of floral development in some species of *Tecoma*, "whose racemes grow out of the old leafless axils of the stem." I am well aware that several of the digitate *Tecomas* flower after all the leaves have fallen off, as, for instance, my *T. Guayacan* from Panama; but I have never seen blossoms on the trunk, or springing from the old wood, as happens in that section of *Colea* which I have termed "*Colea genuina*."

With regard to *Phyllarthron*, which Mr. Miers, notwithstanding the positive testimony of Bojer that it has an indehiscent fruit, also wished to expel from Crescentiaceæ, I obtained some additional information during my late visit to Mauritius. Mr. Duncan, of the Botanic Garden, showed me a drawing of the fruit of *P. Comorense*, made by his son years ago, according to which it is as fleshy and indehiscent as that of *Parmentiera*; and it is converted into sweetmeats in Mauritius. I regard it simply as a *lapsus pennæ* when Mr. Miers says that I stated *Tripinnaria* to belong to *Kigelia*, as I classed it with *Colea*.

It will therefore be seen that there is no reason why a good natural division should be set aside, and why any genus of Crescentiaceæ enumerated by me should be transferred to Bignoniaceæ. If *Adenocalymna* has really no wings, it would simply form an exception to the generality of Bignoniaceæ; and, in drawing up a diagnosis of the order, the word "plerumque" used in connexion with "semina alata" would remedy the difficulty. But unless I see the fruit actually attached to the specimens, I should hesitate to admit that *Adenocalymna* had wingless seeds. All the other genera having more or less apterous seeds require yet to be studied more closely. *Oxycladus*, Miers, which I think will prove to be identical with *Reyesia*, Clos, I could never bring myself to regard as *Bignoniaceous*; and *Henriquezia*, Benth., with its ally *Platycarpum*, H.B.K., by their semi-inferior ovary, five fertile stamens, and (in *Henriquezia*) stipulate leaves, would seem to be much better placed between Rubiaceæ and Loganiaceæ, forming a natural transition from one to the other. I have seen *Fagræas* with a corolla much more irregular than that of *Henriquezia*.

As my principal object in this communication has been to vindicate the independence and integrity of the Crescentiaceæ as circumscribed in my Synopsis, I shall only touch slightly upon other statements made by Mr. Miers. *Dolichandra* is not marginicidal in its fruit, as Mr. Miers supposes; it is loculicidal, as stated by Chamisso, and must be classed with the *Catal-*

peæ and *Pleostictides*. The authentic specimens in Berlin leave no doubt on this point. It is a climber, the only *Catalpea* having tendrils! I do not consider *Bignonia glutinosa* a congener of it. That species is an erect shrub, and has a different calyx and corolla. Mr. Miers is quite right in referring *Delostoma* to *Catalpeæ*. After the publication of the fine plate of *Codazzia speciosa*, Karst. et Trian. (identified by me in 1859 with *Delostoma integrifolium*, Don), no one could doubt it. *Astianthus* ought also to be transferred to *Catalpeæ*, and placed near *Chilopsis*; *Cybastax* (*Yangua* Spruce, *Spathodea? fraxinifolia* H.B.K.) must share the same fate. *Tabebuia* I would not wish to keep up; most species enumerated under it by DeCandolle belong to *Tecoma* (which I restrict to the arboreous, digitate-leaved, monostictidaceous species), and the others to *Callichlanys*, *Bignonia*, and *Anemopægia**. *Dipterosperma*, Hassk., I class with *Stereospermum* (*D. personatum* = *St. Hasskarli*, Zoll.). Several foreign elements I expel from the order altogether, viz. :—

Bignonia? obovata, Hook. et Arn. = *Stemmudenia pubescens*, Benth., an Apocynca.

B. Peruviana, Linn. = *Vitis bipinnata*, Torr. et Gray, an Apeli-dea, according to an authentic specimen in the British Museum.

B. comosa, Roxb., may prove identical with *Paulownia imperialis*, or rather *P. tomentosa*, Ascherson (*B. tomentosa*, Thunb.), a Scrophularinea.

Bravasia floribunda, DC. = *Onychacanthus Cumingianus*, Nees, an Acanthacea.

Spathodea ilicifolia, Seem. = *Digitalis dracocephaloides*, Arrab. Fl. Flum. vi. t. 101, an Acanthacea, but quite a new genus.

Tourretia lappacca, Willd., I would place amongst Sesameæ, near *Sesamopteris*, as Mr. Miers has already suggested.

For the present I shall content myself with these observations, necessarily forced upon me by what had been written after the publication of my 'Synopsis Crescentiacearum.' But as the public would not be in a fair position to judge of the merits of the case unless Mr. Miers's objections to the above were made known, I submitted the whole of the preceding matter to Mr. Miers; and the letter which he wrote to me after receiving it, and has kindly permitted to appear in these pages, will conclude all I have to offer :—

* *Tabebuia uliginosa*, *T.? leucoxylo*, *T. cassinoides*, *T. hamantha*, *T. triphylla*, *T. fluvialis*, and *T. rosea*, belong to *Tecoma*. *T. ilicifolia* is identical with *Bignonia anastomasans*, and probably the type of a new genus peculiar to Madagascar; *T. latifolia* and *T.? rufinervis* belong to *Callichlanys*; *T. citrifolia* seems to be a species of *Anemopægia*; *T. pyramidata* is = *Zeyhera surinamensis*, Miq. (*Bignonia pyramidata*, Rich., *B. rupestris*, Gardn., *B. Sinclairi*, Bth., and a host of others).

“ My dear Sir,

“ Hammersmith, Feb. 13, 1862.

“ I return your paper with many thanks for its perusal, and for your courtesy in sending it prior to its publication. You are perfectly justified in maintaining your former convictions in regard to *Tanaecium*, if you still believe in them; but I can hardly conceive, in the present state of science, how it is possible for any one to conclude that the *Tanaecium Jaroba*, Sw., and *T. parasiticum*, Sw., with such diametrically opposite characters, can belong to the same genus, or even to the same tribe. Putting aside for the moment the question of the fruit, we find that the structure of the ovary, seated on a peculiar disk, in the former, is quite that of *Adenocalymmu* and of a few congeners, while that of *Schlegelia* has its ovules fixed in the middle of the dissepiment. In regard to the fruit which I described as that of *T. albiflorum*, it is true that it is not accompanied by any flowering specimen; but, coupled with the fact of the structure of the ovary, which I have fully verified, the evidence becomes almost complete; for the fruit in question agrees in size with Swartz's description in its singular oblong shape, its hard, smooth, 2-locular, 2-valved shell, with “many large, broad, compressed, imbricated seeds”—characters that scarcely leave a doubt as to its specific identity. This, again, is confirmed by the coincidence of flowering specimens of *T. prælongum* and fruit, both sent from British Guiana by Schomburgk*. The structure of the ovary, about which a doubt cannot be raised, shows the true position of *Tanaecium*, and proves incontestably that it cannot belong to *Crescentiaceæ*.

“ With regard to *Parmentiera*, I regretted that you had not given more tangible characters of its fruit, and had not shown the structure of the ovary. I referred, in the absence of these, to your drawing, which marks, by two very distinct transversal lines, that the fruit is 2-valvular, no such sutural lines being found in *Crescentia*. I argued therefore that *if* these (your own) indications be confirmed, and *if* the ovary be found to be 2-locular, with ovules peculiarly placed, *then Parmentiera* ought to be referred to Bignoniaceæ. This would of course include *Catalpææ*, where it would go under certain conditions to be proved. I think you will not venture to gainsay so legitimate an inference. The characters to which you seem to attach so much importance—of flowers issuing from the trunk (also partial in other families), and of the edible fruit—are of no value in an *ordinal* point of view, whatever consideration they may deserve as *generic* attributes†. They would seem to show a close affinity between *Colea* and *Parmentiera*.

“ What I mentioned about *Colea* was founded on the statements recorded up to that time by the best authorities; if those facts be erroneous according to the evidence you have since obtained at the Mauritius, you must deal fairly with the inferences previously drawn

* The fruit from British Guiana in the British Museum here alluded to is not accompanied by any herbarium specimens, though it is quite true that Schomburgk did send a *Tanaecium* in flower from that locality.—B. S.

† I did not say they possessed any *ordinal* value, but simply quoted them in proof of the fruit being fleshy and heavier than a mere dry capsule.—B. S.

and derived from the only legitimate sources at command. You admit that the figure of *C. Mauritiana* shows winged seeds. *C. Telfairia*, in 'Bot. Mag.' 2976, with a 2-valved fruit, is stated, on Bojer's authority, to have 'a spongy dissepiment bearing many seeds, which are surrounded by a thin and broad pellucid margin.' *C. floribunda*, which I have seen, had an unripe flattish capsule, very like that of a *Tecoma**. It will be gratifying to see any fresh evidence you can offer in regard to the structure of the ovary and fruit of *Colea*.

"I think it will be conceded by botanists that the only legitimate line of distinction between Crescentiaceæ and Bignoniaceæ exists in the former having a 1-locular ovary with parietal placentation (as I have seen in *Crescentia* and *Kigelia*), and a fruit with a solid sutureless shell, containing fleshy wingless seeds. In Bignoniaceæ we have a 2-locular ovary with ovules widely separated on the dissepiment, and a 2-celled, 2-valved fruit, generally, but not always, with winged seeds: it would be quite legitimate with this character (as in your *Parmentiera cerifera*) that the dissepiment should be large and cylindrical (as occurs also in *Stereospermum*), and that its valves should be prevented from bursting by a fleshy or coriaceous epicarp; for many capsules of true Bignoniæ are covered by a thick coriaceous envelope that keeps them from dehiscing for a long time after the fruit is ripe and has fallen. At all events, neither *Parmentiera* nor *Colea* can belong to Crescentiaceæ according to any legitimate line of demarcation. Crescentiaceæ, after the principle I have defined, form a very distinct group; but they cease to be so under your division, for you there break through the rule of carpellary arrangement, which forms the basis on which the grand system of Jussieu is founded. The Jacarandæ accord with Crescentiaceæ in their 1-celled ovary, with a parietal attachment of their ovules and seeds, but differ in having a dehiscent capsule with winged seeds. *Schlegelia*, from the construction of its ovary, will probably be found to belong to the group where my *Oxycladus* must find a place; for there can be no doubt, from the structure of its ovary, that it is a truly Bignoniaceous genus. I mentioned to you, after your return to England, that I had seen the fruit of *Fridericia*, and had convinced myself of the error of Martius, and had consequently erased the mistake from all the copies of my 'Observations' and 'Contributions;' and that ought to be considered a sufficient acknowledgment: it is enough to answer for our own mistakes, without being saddled with the errors of others. These observations are offered in the most friendly spirit, and may perhaps induce you to reconsider the matter before you publish your remarks. We have both the same object in view, which is to elicit the truth.

"I am, my dear Sir, very truly yours,

"JOHN MIERS."

22 Canonbury Square, London, N.

February 1862.

* As *Colea floribunda* flowers from the old wood, of course the leaves or flowers cannot be attached to this fruit; and hence it must be regarded as doubtful, or, at all events, as inconclusive.—B. S.